

**ABSTRACT**

Iterative, preferably computer based iterative processes for generating synthetic compounds with desired physical, chemical and/or bioactive properties, i.e., active compounds, are provided. During iterations of the processes, a target nucleic acid sequence is provided or selected, and a library of candidate nucleobase sequences is generated *in silico* according to defined criteria. A "virtual" oligonucleotide chemistry is chosen and a library of virtual oligonucleotide compounds having the selected nucleobase sequences is generated. These virtual compounds are reviewed and compounds predicted to have particular properties are selected. The selected compounds are robotically synthesized and are preferably robotically assayed for a desired physical, chemical or biological activity. Active compounds are thus generated and, at the same time, preferred sequences and regions of the target nucleic acid that are amenable to oligonucleotide or sequence-based modulation are identified.